Kalm in America and by Osbeck in China, and he must ever plead guilty to the charge of needlessly changing names already given by his predecessors.

## A NOTE ON THE "FLOWERING" OF THE LAKES IN THE ADIRONDACKS

By Marshall A. Howe

In the spring of 1902, Mrs. Annie Morrill Smith, of Brooklyn, sent me for determination a small alga, which in the very full notes accompanying the communication, she stated to be chiefly responsible for the phenomenon known to the guides of the Adirondack region as the "flowering" or "blossoming" of the lakes. A portion of Mrs. Smith's letter runs as follows:

"I spent the summers of 1891, 1892, and 1893 at Honnedaga Lake, Herkimer County, N. Y., on the Adirondack League Club Tract. The altitude is about 2,200 feet, or possibly 2,400 feet. On the 14th of August of each year we noticed for the first time the water of the lake filled with golden globules so plenty that a glass slowly lowered and withdrawn was clouded. Microscopic examination at the time convinced me (though without books of reference) that it was an alga. It continued plenty as long as we were at Honnedaga, about September 1st each year, how much longer I could not say. At Little Moose Lake, at the northern end of the Club Tract, I made inquiry as to the appearance of the alga, which I may say the guides on all the Club Tract call 'the flowering or blossoming of the lake,' and they all assured me it was never to be seen in Little Moose Lake, though all knew it in Honnedaga and other of the lakes of the tract. While at Chilson Lake [Essex County] in 1901, I asked Mrs. Harris if she had ever noticed such a phenomenon and found that they had seen something of the kind but attributed it to the fall on the lake-surface of the pollen of trees or other plants. This is entirely different, as this last rises to the surface while the alga is more plenty below the surface and never rises

or gives the look of scum as the pollen does. During my visit to Chilson Lake in 1901, going as I did in the middle of May, I kept the phenomenon in mind and was on the watch for it, and singularly enough it was on the 14th day of August that I first saw it. Water was taken and slides made. I left the lake September 15th, making slides from water taken on the 7th. How much longer the alga continued I cannot say."

Further observations by Mrs. Smith at Chilson Lake in the summers of 1902 and 1903 indicate, as might be suspected, that the interesting little alga has no fixed prejudices for the 14th of August as the date for its initial appearance. In 1902, it was first seen on July 26 and Mrs. Smith writes that in 1903 "it was in the lake June 6 when we arrived."

The alga in question, judging from well preserved specimens from Chilson Lake, collected by Mrs. Smith at various times in the summers of 1901 and 1902, is apparently the plant known to some as *Rivularia echinulata* (Sm.) or *Rivularia fluitans* Cohn, to others as *Gloiotrichia Pisum* (Ag.) Thuret, and more recently, as *Gloiotrichia echinulata* (Sm.) P. Richt. It may be remarked, in passing, that the generic names *Rivularia* and *Gloiotrichia*, in their current sense, are both invalid under the provisions of the Paris and Rochester codes, but a note like the present is hardly the place for introducing names that may be new or unfamiliar. The Chilson Lake plants form small colonies mostly about 1 mm. in diameter, but ranging from 0.5 mm. to 1.5 mm. These colonies are usually spherical, rarely reniform or somewhat horseshoe-shaped. The color in mass, when suspended in a fluid (a mixture of one per cent. chrome-alum and one per cent. commercial formalin was used for preservative) is a light bluish-green. In the younger stages, the radiating whip-like filaments which form the colonies are easily separable, but as the colonies get older and the filaments become more numerous, the globular masses become firmer in consistency and the component parts do not separate readily under pressure. Unfortunately, no spores (or, at most, only slight suggestions of the beginning of spore-formation) have been found, though Mrs. Smith's collections were made as late as September 7, in 1901; and the determina-

tion of the plant therefore remains less satisfactory than might be the case were spores present. However, aside from the absence of spores the agreement is close between the Chilson Lake plants and German specimens (from the biological station at Plön), distributed as No. 587 of the Phykotheka universalis of Hauck and Richter under the name *Gloiotrichia echinulata*. The most striking difference noticed in comparing fluid-preserved materials of the Chilson plant with the dried specimens issued under this No. 587 and the figures accompanying this number is the greater development of terminal hairs of the Chilson specimens. The length of these nearly colorless hairs is commonly greater than the whole diameter of the darker and denser central portion of the sphere. But the delicate terminal portion of the hair does not preserve well in drying and the difference is less striking, though still apparent, when dried specimens of the two are compared. However, the length of the hair varies with the age of the colony and in certain stages the hairs may be entirely wanting. The colonies evidently multiply very rapidly through the agency of hormogonia and before a filament breaks up into these hormogonia, the terminal hair-like part falls off.

The *Gloiotrichia echinulata* is accompanied by a relatively small quantity of a spore-bearing *Anabaena*, another alga belonging also to the blue-green class. The *Anabaena* forms still more minute colonies, which are of a yellowish color.

The "flowering" or "blossoming" of lakes, due to the alga *Gloiotrichia echinulata* and exhibiting the phenomena observed by Mrs. Smith, does not seem to have been recorded, so far as the writer can discover, for the eastern portion of North America. But it appears to be common in Minnesota and has been reported also from Wisconsin.* In the years 1882–1884, Professor J. C. Arthur was called upon to investigate the cause of the mysterious death of domestic animals in the State of Minnesota, supposed to have resulted from the drinking of water at a time when it was

* Trelease, Trans. Wis. Acad. Sci. 7: 121–129. 1888.

Probably Michigan also should be included, for Campbell mentions "*Rivularia echinata* Eng. Bot." in a list of plants of the Detroit River (Bull. Torrey Club, 13: 93. 1886).

filled with a minute alga. Several notes and papers reporting the progress of the investigations were published, the principal of these being a paper on "Some Algae of Minnesota, supposed to be Poisonous," printed in the Bulletin of the Minnesota Academy of Natural Sciences (3: 97–103. 1885). Direct experiments in the way of allowing thirsty animals to drink of water well charged with the alga were followed by no bad results, so that the general conclusion was "that the death of the animals is probably not due to the suspected algae and that no clue to the real cause has yet been obtained." Mrs. Smith states that no reports of any poisonous action of the algae at the time of the "flowering" of the Adirondack lakes have come to her attention. The Minnesota alga was first referred to *Rivularia fluitans*, but later, following the opinion of Bornet, it was called *Gloiotrichia Pisum*. Subsequently Bornet and Flahault * included *Rivularia fluitans* in the synonymy of *Gloiotrichia Pisum*.

Through the courtesy of Professor Farlow the writer has seen a specimen of the Minnesota plant collected by him in Lake Minnetonka in August, 1883, and a comparison of this with the Chilson Lake specimens affords no ground for suspicion that the two are not the same species, though the former is spore-bearing and the latter are not.

In 1888, Professor Trelease, in a paper entitled "The 'Working' of the Madison Lakes," † refers to *Gloiotrichia Pisum* as one of several blue-green algae which are responsible for the "working" of the lakes in the vicinity of Madison, Wisconsin. A considerable bibliography of this interesting subject is appended to Professor Trelease's paper and to this the reader may be referred for citations of literature which need not be repeated here. The phenomenon is well known in England as the "breaking of the meres" and in Germany as "Wasserblüthe."

In 1894, Richter contended for the specific separation ‡ of *Gloiotrichia echinulata* (Sm.) P. Richt. and *G. Pisum* (Ag.) Thuret and a little later in the same year § wrote *Rivularia fluitans* as a

* Ann. Sci. Nat. VII. 4: 366. 1886.

† Trans. Wis. Acad. Sci. 7: 121–129. 1888.

‡ Forschungsber. Biol. Sta. Plön, 2: 31–47. 1894.

§ Hauck and Richter, Phyk. Univ. Fasc. XII., No. 587. 1894.

synonym of *Gloiotrichia echinulata*. Richter's distinction of *Gloiotrichia echinulata* and *G. Pisum* is adopted by Kirchner in Engler & Prantl's Pflanzenfamilien (1[1a]: 90. 1898).

Dr. A. Schmidt, in a paper * known to the writer only through a notice in Just's Jahresbericht,† protests against Richter's union of *Rivularia fluitans* and *Gloiotrichia echinulata*. Some remarks on *Rivularia fluitans* by Dr. Schmidt are published in the Verhandlungen des Botanischen Vereins der Provinz Brandenburg for 1897 (39: xxxi–xxxiv).

"Observations upon some Algae which cause 'Water Bloom'" ‡ is the title of a recent paper by N. P. B. Nelson, dealing with the plants concerned in "water-bloom" as it occurs in Minnesota.

It is to be hoped that subsequent collections of the supposed *Gloiotrichia echinulata* in the Adirondack region may result in securing spore-bearing specimens, which will afford a more satisfactory basis for comparison with closely related or identical forms of Europe and of our western States.

## EXCERPTS FROM DR. OTTO KUNTZE'S NOMENCLATURAE BOTANICAE CODEX BREVIS MATURUS §

It is a pity that our American botanical friends of U. S. A. practice promptly their new inconsiderate rules and neglect afterwards contrary facts. Thus they maintain their Rochester resolutions, although I proved in my Rev. III[II], § 28–30, that 20,000–30,000 names were still to be changed by these resolutions, which they, contrary to scientific principles, will not do. Formerly the Bulletin of the Torrey Botanical Club reported always about my Revisio gen. I/II, III[I], but about my Revisio

* Schrift. naturf. Ges. Danzig, 9: 27–31. 1898.

† Bot. Jahresb. 26[1]: 294. 1900.

‡ Minn. Bot. Studies, 3: 51–56. *pl. 14.* 1903.

§ Nomenclaturae botanicae codex brevis maturus sensu codicis emendati aux Lois de la nomenclature botanique de Paris de 1867 linguis internationalibus: Anglica, gallica, germanica quoad nomina latina, auctore Otto Kuntze. Stuttgart, 1903. [Excerpts from English version, pp. XLVII–XLVIII, LV–LVII.]